

CLAIMS

What is claimed is:

1. A system for applying a marking to an optical media, the system comprising:
 - a unit for applying a coating comprising at least one photosensitive material to at least one readout area of the optical media;
 - a first light source for exposing the coating to wavelengths of light wherein the wavelengths of light cure the coating upon the at least one readout area;
 - a unit for creating an image of the marking; and,
 - a second light source for exposing at least a portion of the coating to the image for recording the marking into the coating.
2. The system as in claim 1, wherein the wavelengths produced by the first light source comprise wavelengths substantially separate from wavelengths of the second light source.
3. The system as in claim 1, wherein at least one of the first light source and the second light source comprise a wavelength filter.
4. The system as in claim 3, wherein the wavelength filter comprises a wavelength cutoff filter rated for wavelengths between about 340 nm to about 370 nm.
5. The system as in claim 1, wherein the coating comprises at least one each of a photoinitiator, a photoacid generator and a color former.
6. The system as in claim 5, wherein the photoinitiator comprises at least one of: a stable liquid mixture of trimethylbenzoyldiphenylphosphine oxide, α -hydroxyketones, and benzophenone derivatives; 2-Benzyl-2-dimethylamino-1-(4-morpholinophenyl)-butanone-1; Bis(2,4,6-trimethylbenzoyl)-phenylphosphineoxide; an eutectic liquid mixture of: 2,4,6-trimethylbenzophenone and 4 methylbenzophenone; a mixture of 50 % 2,4,6-Trimethylbenzoyl-diphenyl-phosphineoxide and 50 % 2-Hydroxy-2-methyl-1-phenyl-propan-1-one; 1-[4-(2-Hydroxyethoxy)-phenyl]-2-hydroxy-2-methyl-1-

propane-1-one; isopropyl thioxanthone; a liquid mixture of about 70% Oligo [2-hydroxy-2-methyl-1-[4-(1-methylvinyl) phenyl] propanone and about 30% 2-hydroxy-2-methyl-1-phenyl propan-1-one.

7. The system as in claim 5, wherein the photoacid generator comprises at least one of: bis (4-tert-butylphenyl) iodonium p-toluenesulfonate; (tert-butoxycarbonylmethoxynaphthyl) diphenyl sulfonium triflate; (4-phenoxyphenyl) diphenyl sulfonium triflate; (4-tert-Butylphenyl) diphenyl sulfonium triflate; diphenyliodonium hexafluorophosphate; diphenyliodonium triflate; triphenylsulfonium triflate; 2-methyl-4,6-bis(trichloromethyl)-s-triazine; tris(2,4,6-trichloromethyl)-s-triazine; 2-phenyl-4,6-bis(trichloromethyl)-s-triazine; 2-(4-chlorophenyl)-4,6-bis(trichloromethyl)-s-triazine; (4-methylphenyl)diphenyl sulfonium triflate; and, diphenyl iodonium hexafluorophosphate.
8. The system as in claim 5, wherein the color former comprises at least one of COPIKEM 16 Red, COPIKEM 6 Green, COPIKEM 34 Black, PERGASCRIP T Red I-6B, BK-305 Black, S-205 Black, BK-400, PERGASCRIP T Orange I-G, PERGASCRIP T Green I-2GN, PERGASCRIP T Blue I-2RN, PERGASCRIP T Black I-2R and Red 520.
9. The system as in claim 5, wherein the coating further comprises a wetting agent.
10. The system as in claim 9, wherein the wetting agent comprises at least one of a polyether modified poly-dimethyl-siloxane; a crosslinkable silicone polyether acrylate; and a crosslinkable silicone acrylate.
11. The system as in claim 1, wherein the coating comprises a mixture comprising at least one acrylate.
12. The system as in claim 11, wherein the acrylate comprises at least one of: ethoxylated pentaerythritol tetraacrylate; 1,6 hexanediol diacrylate; tetrahydrofurfuryl acrylate; highly propoxylated (5.5) glyceryl triacrylate; 3 mole propoxylated glyceryl triacrylate; 3 mole ethoxylated trimethylolpropane

triacylate; tris (2-hydroxy ethyl) isocyanurate triacylate; ditrimethylolpropane tetraacylate; urethane diacylate oligomer; isobornyl acrylate; a difunctional bisphenol A based epoxy acrylate; a low viscosity aliphatic diacylate oligomer; tris (2-hydroxy ethyl) isocyanurate triacylate; 2-phenoxyethyl acrylate; a difunctional bisphenol A based epoxy acrylate blended with 40% 1,6 hexanediol diacylate; a difunctional bisphenol A based epoxy acrylate blended with 50%, 2-phenoxyethyl acrylate; and acrylic acid.

13. The system as in claim 11, wherein the acrylate comprises at least one non-alkoxylated monomer.
14. The system as in claim 1, further comprising a unit for applying a photoabsorptive material to the coating.
15. The system as in claim 1, wherein the coating comprises at least one of: 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol; 2-(2H-benzotriazol-2-yl)-6-dodecyl-4-methyl-phenol; a mixture of reaction products of methyl 3-(3-(2H-benzotriazole-2-yl)-5-tert-butyl-4-hydroxyphenyl) propionate and PEG 300; branched and linear 2-(2H-benzotriazol-2-yl)-6-dodecyl-4-methylphenol; 2-(2'-hydroxy-5'-methacryloxyethylphenyl)-2H-benzotriazole; 2,2'-dihydroxy-4-methoxybenzophenone; 2-Hydroxy-4-n-octoxybenzophenone; and, octyl methoxycinnamate.
16. The system as in claim 1, wherein the system comprises an optical media replication system.
17. The system as in claim 1, wherein the format of the optical media comprises one of DVD 5, DVD 9, DVD 10, DVD 18, DVD-R, DVD-RW, CD-Audio, CD-Video, CD-R, CD-RW, CD-ROM, CD-ROM/XA, CD-i, CD-Extra, CD-Photo, Super-Audio CD, Blu-Ray, Mini-Disc and a hybrid format.
18. The system as in claim 1, wherein the applying unit comprises at least one spin coating station.

19. The system as in claim 1, wherein the image creating unit comprises a photomask comprising an image of the marking.
20. The system as in claim 1, wherein the image creating unit comprises a direct writing laser for forming an image of the marking.
21. The system as in claim 1, wherein the image creating unit comprises an electronically programmable photomask for forming an image of the marking.
22. The system as in claim 1, further comprising an inspection station for inspecting the quality of at least one of the substrate, the coating, the curing of the coating, and the marking in the coating.
23. The system as in claim 1, wherein the coating is applied to one of the substrate layer, the reflective layer, and the protective layer of the optical media.
24. The system as in claim 1, further comprising a system controller for operating the system.
25. The system as in claim 1, wherein the marking comprises at least one of: text information, alphanumeric characters, symbols, graphic information, embedded information, a digital watermark and a covert marking.
26. The system as in claim 1, wherein the marking comprises at least one of identification information, authentication information, instructional information, advertising, branding, and promotional information.
27. A system for applying a color forming coating to the readout area of an optical media, the system comprising:
 - a unit for applying the color forming coating to the readout area of the optical media, the coating comprising a photocurable component sensitive to a first set of wavelengths and a photosensitive color forming component sensitive to a second set of wavelengths substantially separate from the first set of wavelengths;

a light source for exposing the coating to the first set of wavelengths.

28. A system for marking the readout area of an optical media, the system comprising:

a station for receiving the optical media, the optical media comprising at least a color forming coating disposed thereon, the coating comprising a photocurable component sensitive to a first set of wavelengths and a photosensitive color forming component sensitive to a second set of wavelengths substantially separate from the first set of wavelengths,

a unit for creating an image of a marking; and,

a light source for producing the second set of wavelengths and exposing at least a portion of the coating to the image for recording the marking into the coating.

29. The system as in claim 28, further comprising a unit for applying an overcoat over the color forming coating.

30. A method for marking a readout area of an optical media, comprising:

applying a coating comprising at least one color forming material to the readout area of the optical media;

exposing the coating to a first set of wavelengths;

curing the coating applied upon the at least one readout area;

selectively exposing portions of the coating in a pattern for recording the marking into the coating by using a second set of wavelengths substantially separate from the first set of wavelengths.

31. The method as in claim 30, wherein applying the coating comprises spincoating the coating onto the optical media.

32. The method as in claim 30, wherein applying comprises controlling the temperature of the color forming material.

33. The method as in claim 30, wherein applying comprises controlling the viscosity of the coating.

34. The method as in claim 30, wherein applying comprises controlling the thickness of the coating.
35. The method as in claim 30, wherein applying comprises replacing a component layer of the optical media.
36. The method as in claim 30, wherein curing comprises providing an environment comprising an inert gas.
37. The method as in claim 30, wherein the first set of wavelengths comprises wavelengths above about 370 nm.
38. The method as in claim 30, wherein the second set of wavelengths comprises wavelengths between about 270 nm to about 320 nm.
39. The method as in claim 30, wherein selectively exposing comprises using at least one of a photomask and a direct writing laser.
40. The method as in claim 30, wherein applying a coating further comprises applying at least one photoabsorptive material.
41. A computer program stored on computer readable media comprising a set of instructions for operation of a system for producing optical media comprising at least one marking disposed upon the readout side of the optical media, the instructions for:
 - applying a coating comprising at least one color forming material to the readout area of the optical media;
 - exposing the coating to a first set of wavelengths;
 - curing the coating applied upon the at least one readout area;
 - selectively exposing portions of the coating in a pattern for recording the marking into the coating by using a second set of wavelengths substantially separate from the first set of wavelengths.

42. The computer program as in claim 41, wherein the instructions for operation are executed by a system controller adapted for controlling the operation of the system.
43. The computer program as in claim 41, wherein the instructions for operation comprise instruction for operation of at least one of an inspection station, a spincoating station, a curing station and a marking station.
44. A system for applying a marking to an optical media, the system comprising:
a unit for applying at least one color forming layer to at least one readout area of the optical media;
a first light source for exposing the at least one color forming layer to a first band of wavelengths to cure the at least one color forming layer;
a second light source for selectively exposing at least a portion of the at least one color forming layer to a second band of wavelengths for recording the marking into the at least one color forming layer;
a unit for applying at least one overcoat layer to the at least one color forming layer; and,
a third light source for exposing the at least one overcoat layer to a third band of wavelengths for curing the at least one overcoat layer.
45. The system as in claim 44, wherein the overcoat layer comprises at least one of a photoabsorptive material and an acid scavenger.
46. The system as in claim 44, wherein the at least one overcoat layer exhibits a high degree of optical density at the second band of wavelengths.
47. A method for applying a marking to an optical media, the method comprising:
applying at least one color forming layer to at least one readout area of the optical media;
exposing the at least one color forming layer to a first band of wavelengths to cure the at least one color forming layer;

selectively exposing at least a portion of the at least one color forming layer to a second band of wavelengths for recording the marking into the at least one color forming layer;

applying at least one overcoat layer to the at least one color forming layer; and,

exposing the at least one overcoat layer to a third band of wavelengths for curing the overcoat layer.